CLAIMS

1. An insulator comprising a laminate of one or more insulation unit layers etchable by a wet process, said insulator having been subjected to plasma treatment after wet etching.

2. The insulator according to claim 1, wherein the plasma treatment has been carried out for not less than 0.01 sec and not more than 30 min.

3. The insulator according to claim 1, wherein the plasma treatment has been carried out under the atmospheric pressure.

4. The insulator according to claim 1, wherein the plasma treatment has been carried out under reduced pressure.

5. The insulator according to claim 1, wherein all the insulation unit layers contain an organic material.

6. The insulator according to claim 1, wherein all the insulation unit layers contain an organic material and at least one of the unit layers further contains an inorganic material.

7. The insulator according to claim 5, wherein the organic material is a polyimide resin.

8. The insulator according to claim 1, wherein at least one of the insulation unit layers is formed of a low-expansion polyimide having a coefficient of linear thermal expansion of not more than 30 ppm.

9. The insulator according to claim 1, which comprises a laminate of one or more insulation unit layers etchable by the wet process and has a layer construction of adhesive polyimide - low-expansion polyimide having a coefficient of linear thermal expansion of not more than 30 ppm - adhesive polyimide.

10. The insulator according to claim 1, wherein the wet etching has been carried out with an etching liquid having a pH value of more than 7.0.

11. The insulator according to claim 1, wherein the

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insulator exists as an insulating layer in a laminate having a layer construction of first inorganic material layer - insulating layer - second inorganic material layer or a layer construction of inorganic material layer - insulating layer and at least a part of the inorganic material layer has been removed to expose the insulating layer.

12. The insulator according to claim 11, wherein all the inorganic material layers are formed of copper or surface treated copper.

13. The insulator according to claim 11, wherein all the inorganic material layers are formed of alloy copper or surface treated alloy copper.

14. The insulator according to claim 11, wherein all the inorganic material layers are formed of stainless steel or surface treated stainless steel.

15. The insulator according to claim 11, wherein one of the inorganic material layers is formed of stainless steel or surface treated stainless steel and the other inorganic material layer is formed of copper or surface treated copper.

16. The insulator according to claim 11, wherein one of the inorganic material layers is formed of stainless steel or surface treated stainless steel and the other inorganic material layer is formed of alloy copper or surface treated alloy copper.

17. An electronic circuit component comprising the insulator according to any one of claims 1 to 16 applied as an insulating layer.

18. A suspension for a hard disk drive, comprising the insulator according to any one of claims 1 to 16 applied as an insulating layer.

19. An insulator comprising a laminate of one or more insulation unit layers etchable by a wet process, said insulator having been heat treated after wet etching.

20. The insulator according to claim 19, wherein

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the heat treatment is carried out at a temperature of not less than 100°C and not more than 400°C for not less than 0.01 sec and not more than 30 min.

21. The insulator according to claim 19, wherein the heat treatment has been carried out under an inert atmosphere.

22. The insulator according to claim 19, wherein the heat treatment has been carried out under a reduced pressure of not less than 10^{-2} Torr.

23. The insulator according to claim 19, wherein all the insulation unit layers contain an organic material.

24. The insulator according to claim 19, wherein all the insulation unit layers contain an organic material and at least one of the unit layers further contains an inorganic material.

25. The insulator according to claim 23, wherein the organic material is a polyimide resin.

26. The insulator according to claim 19, wherein at least one of the insulation unit layers is formed of a low-expansion polyimide having a coefficient of linear thermal expansion of not more than 30 ppm.

27. The insulator according to claim 19, which comprises a laminate of one or more insulation unit layers etchable by the wet process and has a layer construction of adhesive polyimide - low-expansion polyimide having a coefficient of linear thermal expansion of not more than 30 ppm - adhesive polyimide.

28. The insulator according to claim 19, wherein the wet etching has been carried out with an etching liquid having a pH value of more than 7.0.

29. The insulator according to claim 19, wherein the insulator exists as an insulating layer in a laminate having a layer construction of first inorganic material layer - insulating layer - second inorganic material layer or a layer construction of inorganic material layer - insulating layer and at least a part of

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the inorganic material layer has been removed to expose the insulating layer.

30. The insulator according to claim 29, wherein all the inorganic material layers are formed of copper or surface treated copper.

31. The insulator according to claim 29, wherein all the inorganic material layers are formed of alloy copper or surface treated alloy copper.

32. The insulator according to claim 29, wherein all the inorganic material layers are formed of stainless steel or surface treated stainless steel.

33. The insulator according to claim 29, wherein one of the inorganic material layers is formed of stainless steel or surface treated stainless steel and the other inorganic material layer is formed of copper or surface treated copper.

34. The insulator according to claim 29, wherein one of the inorganic material layers is formed of stainless steel or surface treated stainless steel and the other inorganic material layer is formed of alloy copper or surface treated alloy copper.

35. An electronic circuit component comprising the insulator according to any one of claims 19 to 34 applied as an insulating layer.

36. A suspension for a hard disk drive, comprising the insulator according to any one of claims 19 to 34 applied as an insulating layer.

37. An insulator comprising a laminate of one or more insulation unit layers etchable by a wet process, said insulator having been treated with a dehydration catalyst after wet etching.

38. The insulator according to claim 37, wherein the dehydration catalyst is an acid anhydride or an acid anhydride diluted with a solvent.

39. The insulator according to claim 37, wherein the dehydration catalyst is a carbodiimide or a carbodiimide diluted with a solvent.

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40. The insulator according to claim 37, wherein the dehydration catalyst is a compound selected from acetic anhydride, tetrafluoroacetic anhydride, dicyclohexylcarbodiimide, carbodiimide resin, 1,5-diazabicyclo[4.3.0]non-5-ene, concentrated sulfuric acid, phosphoryl chloride, and phosphorus trichloride, or the selected compound which has been diluted with a solvent.

41. The insulator according to claim 38, wherein the dehydration catalyst further comprises a tertiary amine and/or pyridine as a reaction accelerator.

42. The insulator according to claim 41, wherein the tertiary amine is triethylamine.

43. The insulator according to claim 37, wherein all the insulation unit layers contain an organic material.

44. The insulator according to claim 37, wherein all the insulation unit layers contain an organic material and at least one of the unit layers further contains an inorganic material.

45. The insulator according to claim 43, wherein the organic material is a polyimide resin.

46. The insulator according to claim 37, wherein at least one of the insulation unit layers is formed of a low-expansion polyimide having a coefficient of linear thermal expansion of not more than 30 ppm.

47. The insulator according to claim 37, which comprises a laminate of one or more insulation unit layers etchable by the wet process and has a layer construction of adhesive polyimide - low-expansion polyimide having a coefficient of linear thermal expansion of not more than 30 ppm - adhesive polyimide.

48. The insulator according to claim 37, wherein the wet etching has been carried out with an etching liquid having a pH value of more than 7.0.

49. The insulator according to claim 37, wherein the insulator exists as an insulating layer in a laminate having a layer construction of first inorganic

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material layer - insulating layer - second inorganic material layer or a layer construction of inorganic material layer - insulating layer and at least a part of the inorganic material layer has been removed to expose the insulating layer.

50. The insulator according to claim 49, wherein all the inorganic material layers are formed of copper or surface treated copper.

51. The insulator according to claim 49, wherein all the inorganic material layers are formed of alloy copper or surface treated alloy copper.

52. The insulator according to claim 49, wherein all the inorganic material layers are formed of stainless steel or surface treated stainless steel.

53. The insulator according to claim 49, wherein one of the inorganic material layers is formed of stainless steel or surface treated stainless steel and the other inorganic material layer is formed of copper or surface treated copper.

54. The insulator according to claim 49, wherein one of the inorganic material layers is formed of stainless steel or surface treated stainless steel and the other inorganic material layer is formed of alloy copper or surface treated alloy copper.

55. An electronic circuit component comprising the insulator according to any one of claims 37 to 54 applied as an insulating layer.

56. A suspension for a hard disk drive, comprising the insulator according to any one of claims 37 to 54 applied as an insulating layer.

57. A process for producing an electronic component, comprising the steps of: wet etching a laminate of conductive inorganic material layer - insulating layer -conductive inorganic material layer or a laminate of conductive inorganic material layer - insulating layer to pattern the conductive inorganic material layer; and then performing wet etching to

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pattern the insulating layer, wherein

the insulating layer in the laminate is wet etchable and has a single-layer structure or a laminate structure of two or more insulation unit layers, and

the patterning of the insulating layer by the wet etching is carried out using a dry film resist.

58. The process for producing an electronic component according to claim 57, wherein the surface of the dry film resist has fine concaves and convexes.

59. The process for producing an electronic component according to claim 58, wherein the fine concaves and convexes are provided by embossing.

60. The process for producing an electronic component according to claim 57, wherein the dry film resist is developable with an aqueous solution and can be separated by the aqueous solution.

61. The process for producing an electronic component according to claim 60, wherein the aqueous solution is an aqueous basic solution.

62. The process for producing an electronic component according to claim 57, wherein the insulating layer is patterned by the wet etching in such a manner that a dry film resist is laminated under reduced pressure onto the laminate in which the conductive inorganic material layer has been patterned, followed by wet etching of the laminate of the dry film resist.

63. The process for producing an electronic component according to claim 61, wherein the laminate of the dry film resist is wet etched by a method wherein, after the laminate of the dry film resist is exposed and developed to perform patterning, in order to improve the resistance of the dry film resist to the etchant for the insulating layer, treatment selected from ultraviolet light irradiation, heat treatment, and a combination of ultraviolet light irradiation with heat treatment is carried out.

64. The process for producing an electronic

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component according to claim 57, wherein the insulating layer in the laminate as the starting material has a thickness of 3 to 500 μm.

65. The process for producing an electronic component according to claim 57, wherein the thickness of the dry film resist is 1.1 to 5 times that of one conductive inorganic material layer in the laminate as the starting material.

66. The process for producing an electronic component according to claim 57, wherein the time necessary for wet etching of the insulating layer is not less than 10 sec and not more than 30 min.

67. The process for producing an electronic component according to claim 57, wherein the temperature in the wet etching of the insulating layer is not less than 10°C and not more than 120°C.

68. The process for producing an electronic component according to claim 57, wherein the single-layer structure or all the two or more insulation unit layers in the insulating layer are formed of an organic material.

69. The process for producing an electronic component according to claim 57, wherein the single-layer structure or at least one layer in the two or more insulation unit layers in the insulating layer is formed of a polyimide resin.

70. The process for producing an electronic component according to claim 57, wherein the single-layer structure or at least one layer in the two or more insulation unit layers in the insulating layer is formed of an inorganic material.

71. The process for producing an electronic component according to claim 57, wherein the single-layer structure or at least one layer in the two or more insulation unit layers in the insulating layer is formed of a composite composed of an organic material and an inorganic material.

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72. The process for producing an electronic component according to claim 57, wherein the single-layer structure or all the two or more insulation unit layers in the insulating layer are formed of a polyimide resin.

73. The process for producing an electronic component according to claim 57, wherein the single-layer structure or at least one layer in the two or more insulation unit layers in the insulating layer is formed of a low-expansion polyimide having a coefficient of linear thermal expansion of not more than 30 ppm.

74. The process for producing an electronic component according to claim 73, wherein the insulating layer has a layer construction of adhesive polyimide - low-expansion polyimide - adhesive polyimide.

75. The process for producing an electronic component according to claim 74, wherein, in the insulating layer having a layer construction of adhesive polyimide - low-expansion polyimide - adhesive polyimide, the two adhesive polyimides are different from each other in composition.

76. The process for producing an electronic component according to claim 57, wherein the etching liquid used for etching the insulating layer has a pH value of more than 9.

77. The process for producing an electronic component according to claim 57, wherein the single conductive inorganic material layer or both the two conductive inorganic material layers in the laminate are formed of copper or surface treated copper.

78. The process for producing an electronic component according to claim 57, wherein the single conductive inorganic material layer or both the two conductive inorganic material layers in the laminate are formed of copper alloy or surface treated copper alloy.

79. The process for producing an electronic component according to claim 57, wherein the single

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conductive inorganic material layer or both the two conductive inorganic material layers in the laminate are formed of stainless steel or surface treated stainless steel.

80. The process for producing an electronic component according to claim 57, wherein one of the two conductive inorganic material layers in the laminate is formed of stainless steel or surface treated stainless steel and the other is formed of copper alloy or surface treated copper alloy.

81. The process for producing an electronic component according to claim 57, wherein one of the two conductive inorganic material layers in the laminate is formed of stainless steel or surface treated stainless steel and the other is formed of copper or surface treated copper.

82. An electronic component produced by the process for producing an electronic component according to any one of claims 57 to 81.

83. A suspension for a hard disk drive, produced by the process for producing an electronic component according to any one of claims 57 to 81.

84. A process for producing an electronic component, comprising the steps of: laminating a laminate of conductive inorganic material layer - insulating layer - conductive inorganic material layer or a laminate of conductive inorganic material layer - insulating layer onto a dry film; and performing wet etching to produce an electronic component, wherein

the insulating layer in the laminate can be patterned by wet etching,

the insulating layer has a single or multilayer structure,

the thickness of the dry film applied is not less than 1.1 times that of one conductive inorganic material layer in the laminate, and

when the material to be etched is dipped in an

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etching liquid held at 70°C, the holding time of the dry film resist pattern is not less than one min.

85. The process for producing an electronic component according to claim 84, wherein at least one side of the dry film resist has fine concaves and convexes.

86. The process for producing an electronic component according to claim 85, wherein the fine concaves and convexes are formed by embossing.

87. The process for producing an electronic component according to claim 84, wherein the dry film resist is developable with an aqueous alkali solution and can be separated by the aqueous alkali solution.

88. The process for producing an electronic component according to claim 84, wherein the insulating layer in the laminate is wet etched at a temperature of 10 to 120°C.

89. The process for producing an electronic component according to claim 84, wherein the etching liquid used for wet etching the insulating layer in the laminate has a pH value of more than 8.

90. The process for producing an electronic component according to claim 84, wherein the lamination of the dry film onto the laminate followed by wet etching is carried out by a method wherein, after the laminate of the dry film is exposed and developed to perform patterning, in order to improve the resistance of the dry film resist to the etchant for the insulating layer, treatment selected from ultraviolet light irradiation, heat treatment, and a combination of ultraviolet light irradiation with heat treatment is carried out.

91. The process for producing an electronic component according to claim 84, wherein the whole of one or more layers constituting the insulating layer in the laminate is formed of an organic material.

92. The process for producing an electronic

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component according to claim 84, wherein at least one layer constituting the insulating layer in the laminate is formed of a composite composed of an organic material and an inorganic material.

93. The process for producing an electronic component according to claim 84, wherein at least one layer constituting the insulating layer in the laminate is formed of a polyimide resin.

94. The process for producing an electronic component according to claim 84, wherein the whole of one or more layers constituting the insulating layer in the laminate is formed of a polyimide resin.

95. The process for producing an electronic component according to claim 84, wherein at least one layer constituting the insulating layer in the laminate is a low-expansion polyimide having a coefficient of linear expansion of not more than 30 ppm.

96. The process for producing an electronic component according to claim 84, wherein the insulating layer in the laminate has a layer construction of adhesive polyimide - low-expansion polyimide - adhesive polyimide.

97. The process for producing an electronic component according to claim 94, wherein, in the insulating layer having a layer construction of adhesive polyimide - low-expansion polyimide - adhesive polyimide, the two adhesive polyimides are different from each other in composition.

98. The process for producing an electronic component according to claim 84, wherein the whole of one or two conductive inorganic material layers in the laminate is formed of copper or surface treated copper.

99. The process for producing an electronic component according to claim 84, wherein the whole of one or two conductive inorganic material layers in the laminate is formed of copper alloy or surface treated copper alloy.

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100. The process for producing an electronic component according to claim 84, wherein the whole of one or two conductive inorganic material layers in the laminate is formed of stainless steel or surface treated stainless steel.

101. The process for producing an electronic component according to claim 84, wherein one of the two conductive inorganic material layers in the laminate is formed of stainless steel or surface treated stainless steel and the other is formed of copper alloy or surface treated copper alloy.

102. The process for producing an electronic component according to claim 84, wherein one of the two conductive inorganic material layers in the laminate is formed of stainless steel or surface treated stainless steel and the other is formed of copper or surface treated copper.

103. An electronic component produced by the process for producing an electronic component according to any one of claims 84 to 102.

104. A suspension for a hard disk drive, produced by the process for producing an electronic component according to any one of claims 84 to 102.

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